Image AF 2812

Docket No.: 50432-293 (G0355) **PATENT**

OIPE JC98 FEB 0 5 2004 PATENT & TRADEMARK OFFICE

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

In re Application of	Customer Number: 20277
Cyrus TABERY, et al.	Confirmation Number: 1966
Application No.: 10/021,782	Group Art Unit: 2812
Filed: December 18, 2001	Examiner: S. Isaac

For: SCANNING LASER THERMAL ANNEALING

REQUEST FOR REINSTATEMENT OF APPEAL

Mail Stop Appeal Brief-Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Sir:

This request is submitted in response to the Office Action mailed December 8, 2003. Pursuant to 37 C.F.R. § 1.193(b)(2)(ii), reinstatement of the appeal filed on September 22, 2003, is respectfully requested. This Request is accompanied by a Supplemental Appeal Brief.

To the extent necessary, a petition for an extension of time under 37 C.F.R. § 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account 500417 and please credit any excess fees to such deposit account.

Respectfully submitted,

MCDERMOTT, WILL & EMERY

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SUPPLEMENTAL APPEAL BRIEF

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This Supplemental Appeal Brief is submitted in support of the Appeal Brief filed September 22, 2003.

I. REAL PARTY IN INTEREST

The real party in interest is Advanced Micro Devices, Inc.

II. RELATED APPEALS AND INTERFERENCES

Appellants are unaware of any related appeals and interferences.

III. STATUS OF CLAIMS

Claims 1-14 are pending and have been thrice rejected. It is from the repeated rejection of claims 1-14 that this Appeal is taken.

IV. STATUS OF AMENDMENTS

No amendment to the claims has been filed subsequent to the Final Office Action dated April 28, 2003, or the third Office Action dated December 8, 2003.

V. SUMMARY OF INVENTION

The present invention addresses and solves problems resulting from the variation in fluence of a laser beam during laser thermal annealing, e.g., by as much as ±5% (page 2 of Appellants' disclosure, lines 23-29). The present invention also addresses and solves the problem of variation in fluence density across a spot area of a laser (page 2, line 30 through page 3, line 7). These problematic variations can cause overexposure of a substrate during laser thermal annealing, thereby disadvantageously overmelting source/drain regions. Another problem associated with variation in fluence density is underexposure of the source/drain regions. Accordingly, a need existed for an improved laser thermal anneal process that reduces fluence variation on a substrate and increases the efficiency of the laser annealing process (page 3, lines 5-7).

According to the present invention, the problem of fluence variation on substrates is solved, in part, by continuously moving the laser and substrate relative to one another while activating portions of source/drain regions, as recited in claim 1. By continually moving the substrate and laser relative to each other, laser pulsing is not interrupted, which allows for greater utilization of the laser (page 8, lines 17-24). The problem of fluence variance is also minimized by reducing the spot area from the laser to less than 50 millimeters^2, as recited in independent claim 6. Because the fluence density is less distorted using a smaller spot, the variation of total fluence provided on the surface is reduced (page 8, lines 1-8). Another solution to the problem

of fluence variance is to expose each portion of the source/drain regions to more than a single pulse of energy from the laser, as recited in claim 11. By exposing each discrete portion of the source/drain regions to several pulses, the variations in fluence between each pulse can be averaged out, which reduces the variance of total fluence provided to the source/drain regions (page 7, lines 23-30). The present invention, thus, constitutes an improvement over conventional methods of manufacturing semiconductor devices by providing methodology that reduces fluence variation to the substrate and increases laser annealing efficiency.

VI. ISSUES

A. The Rejections:

1. Claims 1, 3-6 and 8-14 were rejected under 35 U.S.C. § 102 for lack of novelty based upon Yamazaki et al.; and

2. Claims 2 and 7 were rejected under 35 U.S.C. § 103 for obviousness based upon Yamazaki et al. in view of Appellants' Admitted Prior Art.

B. The Issues Which Arise In This Appeal And Require Resolution By The Honorable Board of Patent Appeals And Interferences (The Board) Are:

1. Whether claims 1, 3-6 and 8-14 are unpatentable under 35 U.S.C. § 102 for lack of novelty based upon Yamazaki et al; and

2. Whether claims 2 and 7 are unpatentable under 35 U.S.C. § 103 for obviousness based upon Yamazaki et al. in view of Appellants' Admitted Prior Art.

VII. GROUPING OF CLAIMS

The appealed claims do not stand or fall together. Claims 1-3 stand or fall together as a group with claim 1. Claims 6-8 and 13 stand or fall together as a group with claim 6. The patentability of claims 4, 5, 9, 10, 11, 12 and 14 are separately advocated.

VIII. THE ARGUMENT

THE REJECTION OF CLAIMS 1, 3-4, 8-12 UNDER 35 U.S.C. § 102 FOR ANTICIPATION BASED UPON YAMAZAKI ET AL., U.S. PATENT NO. 6,242,292 (HEREINAFTER YAMAZAKI)[1]

On page three of the statement of the rejection, the Examiner identified column 9, lines 26-50, in Yamazaki as teaching the last clause in independent claim 1, which is reproduced below:

> wherein the movement of the laser and the substrate relative to one another is continuous between and during the steps of activating the portion of the source/drain regions and activating the other portion of the source/drain regions.

For ease of analysis, column 9, lines 26-50 of Yamazaki is reproduced below:

> In a case where TFTs are formed with crystalline silicon film, when an impurity ion for providing one conductivity type, such as phosphorus or boron, is doped into source and drain regions by ion doping or plasma doping in a self-alignment using a gate electrode as a mask, the doped regions become amorphous or crystallinity thereof is remarkably reduced due to impact of an accelerated ion. Thus, an annealing process for restoring crystallinity of the source and drain regions is required. The doped impurity ion do not act as an impurity for controlling the conductivity type when no treatment is performed. Thus, annealing for activating the impurity ion is required.

[1] The rejections contained in the Final Office Action dated April 28, 2003, are substantially identical to the rejections contained in the previous Office Action dated December 11, 2002, and these rejections have been addressed in the Request for Reconsideration filed February 27, 2003. The Examiner did not change these rejections in the Office Action dated December 8, 2003.

> The annealing process for the above purpose is conducted by irradiation of laser light. TFTs are formed with the crystalline silicon film, by the arrangement as shown in FIG. 5, according to the Embodiment 1 or 2. After the impurity ion is implanted into the source and drain regions of the TFTs, the linear laser light in FIG. 5 is irradiated. In this case, since the source and drain regions are disposed in the line direction of the linear laser, the anneal effect can be made uniform in one TFT. Also, since the direction along which the TFTs are arranged and the line direction of the linear laser light are coincident with each other, the anneal effect on each TFT can be made uniform.

Appellants submit that the Examiner failed to establish where, specifically, the above-identified limitation in claim 1 can be found in Yamazaki.[2] In particular, Appellants refer to the term "the movement ... is continuous between and during the steps of activating the portion ... and activating the other portion."

In the Final Office Action, the Examiner offered the following statement:

> Applicant's arguments filed 2/27/03 have been fully considered but they are not persuasive. Please note on **Fig. 2** that the substrate is not permanently fixed to the stage and therefore moves relative to the laser beam. Applicant contends that the applied art fails to provide continuous movement because applicant has chosen a term that is not actually cited on the reference. <u>However, the reference teaches the term oscillating.</u> One or ordinary skill in the art would recognize that a failure to move the laser <u>continuously (i.e. oscillating)</u> will apply energy beyond the desired goal in forming a thin film transistor having a source/drain regions which are well known in the art. (emphasis in bold in original) (emphasis in underline added).

The Examiner, therefore, has equated the teaching of an "oscillating" movement with the claimed "continuous movement." Notwithstanding that the Examiner has failed to establish between what steps the laser in Yamazaki is oscillating and whether these steps correspond to the steps between which the claimed continuous movement occurs, the terms "oscillating movement" and "continuous movement" would not be considered equivalent by one having ordinary skill in the art. The plain meaning of the term "oscillate" is to move back and forth, and when our object

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[2] 37 C.F.R. § 1.104(c) provides:

> In rejecting claims for want of novelty or for obviousness, the examiner must cite the best references at his or her command. When a reference is complex or shows or describes inventions other than that claimed by the applicant, the particular part relied on must be designated as nearly as practicable. The pertinence of each reference, if not apparent, must be clearly explained and each rejected claim specified.

moves back and forth, i.e., changes direction along a particular path, the object must come to rest before changing directions. Thus, the term "oscillate," which implies no motion at a point, cannot identically disclose the claimed limitation of continuous motion.

With regard to claim 3, Appellants previously argued that the Examiner has failed to clearly identify the claimed limitation of "wherein each portion of the source/drain regions receives more than one single pulse of energy from the laser," in compliance with 37 C.F.R. § 1.104(c). Although the Examiner has pointed to col. 7, lines 1-63 in Yamazaki to disclose this particular feature, it is not apparent where this limitation is disclosed in Yamazaki. Therefore, Appellants respectfully submit that Yamazaki fails to identically disclose this limitation. Despite Appellants' previous arguments that the Examiner has failed to particularly identify this feature, the Examiner has neither clarified where this limitation is found in Yamazaki nor explained why the Examiner's original identification (i.e., col. 7, lines 1-63) is sufficient to comply with the requirements of 37 C.F.R. § 1.104(c).

As to claim 8, Appellants have previously noted the Examiner asserts that Yamazaki identically discloses the limitations recited therein, but claim 8 depends upon claim 6, and the Examiner has not asserted that Yamazaki identically discloses the limitation in claim 6. If the Yamazaki identically discloses the limitations of claim 8, which includes the limitations of claim 6, how can Yamazaki not identically disclose the limitations of claim 6? Thus, the Examiner's rejections as to claims 6 and 8 are inconsistent. Furthermore, as discussed above with regard to claim 3, the Examiner has not clearly identified the portion of the reference being relied upon in the rejection, as the Examiner only generally referred to column 7, lines 1-63 of Yamazaki. It is

not apparent wherein Yamazaki teaches or suggests the limitations recited in claim 8. Therefore, Appellants respectfully submit that Yamazaki fails to identically disclose these limitations.

Claims 4, 9 and 12 each recite that each pulse from the laser respectively irradiates non-identical portions of the source/drain regions. The Examiner has not interpreted the expression "non-identical portions." As such, Appellants cannot evaluate the Examiner's assertion that this feature is disclosed in Yamazaki. Furthermore, the Examiner has not clearly identified any portion of the reference being relied upon. The Examiner has again broadly referred to column 7, lines 1-63 of Yamazaki. However, it is not apparent wherein Yamazaki teaches or suggests this limitation. Therefore, Appellants respectfully submit that Yamazaki fails to identically disclose these limitations.

As to claim 10, the Examiner asserts Yamazaki teaches that the laser and substrate move relative to one another at a constant velocity, but again, the Examiner has failed to clearly identify the portion in Yamazaki being relied upon. Although the Examiner subsequently identified column 6, lines 3-45 as disclosing this feature with regard to claim 14, it is not apparent that the claimed limitation can be found in this citation. Therefore, Appellants respectfully submit that Yamazaki fails to identically disclose these limitations. Yet again, although these issues were raised by Appellants in the Request for Reconsideration, the Examiner failed to address Appellants' arguments in the Final Office Action.

With regard to independent claim 11, the Examiner again asserts that Yamazaki teaches all the claimed features without specifically identifying where any of these features are disclosed in the cited reference. For example, the Examiner has failed to identically disclose where the limitation "the laser and the substrate move relative to one another after each pulse of laser

energy and each portion of the source/drain regions receives more than one single pulse of energy from the laser" is identically disclosed by Yamazaki.

THE REJECTION OF CLAIMS 5-6 AND 13 UNDER 35 U.S.C. § 102 FOR ANTICIPATION BASED UPON YAMAZAKI

In the Office Action dated December 8, 2003, the Examiner newly rejected claims 5-6 and 13 under 35 U.S.C. § 102 for anticipation based upon Yamazaki. In the prior Office Action (i.e., the Final Office Action dated April 28, 2003), claims 5-6 and 13 were rejected under 35 U.S.C. § 103 for obviousness based upon Yamazaki in view of Appellants Admitted Prior Art. The new portions of the Examiner's rejection are highlighted in bold on page 4 of the Office Action dated December 8, 2003.

Claims 5-6 and 13 each include a limitation directed to "a spot area of the laser on the substrate is less than 50 millimeters^2." In the statement of the rejection the Examiner referred to column 3, lines 24-25 of Yamazaki, and asserted that "**the linear beam of 1mm width and 125 mm length is equal 12.5 mm^2**" (emphasis in original). Upon reviewing the passage in Yamazaki cited by the Examiner and also reviewing column 7, line 48, Appellants agree that Yamazaki teaches a linear beam having a beam pattern of 125 mm x 1 mm. However, Appellants disagree with the Examiner's conclusion that 1 mm x 125 mm is 12.5 mm^2, since 1 mm x 125 mm is 125 mm^2. As 125 mm^2 is greater than the claimed less than 50 mm^2, Yamazaki fails to identically disclose this particular limitation within the meaning of 35 U.S.C. § 102.

THE REJECTION OF CLAIMS 2 AND 7 UNDER 35 U.S.C. § 103 FOR OBVIOUSNESS BASED UPON YAMAZAKI IN VIEW OF FIG. 2A OF APPELLANTS' ADMITTED PRIOR ART (HEREINAFTER ADMITTED PRIOR ART)

Claims 2 and 7 are patentable at least based upon their dependency respectively to claims 1 and 6. As discussed above, the applied prior art fails to identically disclose the limitations recited in independent claims 1 and 6. Furthermore, the Examiner has not established that the Examiner's secondary reference of the Admitted Prior Art overcomes the previously argued deficiencies of Yamazaki.

IX. CONCLUSION

It should, therefore, be apparent that the Examiner has failed to establish, within the meaning of 35 U.S.C. § 102, that Yamazaki identifies all of the claimed limitations recited in the claims. With regard to many of the claim limitations, including at least one limitation in all of the independent claims, the Examiner has only cited to broad sections of Yamazaki without clearly identifying where the claimed limitations are identically disclosed in Yamazaki. Furthermore, the Examiner's failed to set forth a prima facie case of obviousness for the claimed ranges since the Examiner's analysis lacks the findings of fact required by case law.

X. PRAYER FOR RELIEF

Based upon the foregoing, Appellants respectfully submit that one having ordinary skill in the art would not have found the claimed invention identically disclosed by Yamazaki within the meaning of 35 U.S.C. § 102 or that one having ordinary skill in the art would have found the

claimed invention obvious based upon Yamazaki in view of the Admitted Prior Art. Appellants, therefore, respectfully solicit the Honorable Board to reverse the Examiner's rejections under 35 U.S.C §§ 102, 103.

To the extent necessary, a petition for an extension of time under 37 C.F.R. § 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account 500417 and please credit any excess fees to such deposit account.

Respectfully submitted,

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Registration No. 42,984

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Date: February 5, 2004
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APPENDIX

1. A method of manufacturing a semiconductor device, comprising the steps of:

forming a gate electrode over a substrate;

introducing ions into the substrate to form source/drain regions in the substrate proximate to the gate electrode;

activating a portion of the source/drain regions by laser thermal annealing using a laser; moving the laser and the substrate relative to one another; and

activating another portion of the source/drain regions by laser thermal annealing using the laser,

wherein the movement of the laser and the substrate relative to one another is continuous between and during the steps of activating the portion of the source/drain regions and activating the other portion of the source/drain regions.

2. The invention according to claim 1, wherein each portion of the source/drain regions receives no more than one single pulse of energy from the laser.

3. The invention according to claim 1, wherein each portion of the source/drain regions receives more than one single pulse of energy from the laser.

4. The invention according to claim 1, wherein each pulse from the laser respectively irradiates non-identical portions of the source/drain regions.

5. The invention according to claim 1, wherein a spot area of the laser on the substrate is less than 50 millimeters^2.

6. A method of manufacturing a semiconductor device, comprising the steps of:

forming a gate electrode over a substrate;

introducing ions into the substrate to form source/drain regions in the substrate proximate to the gate electrode;

activating a portion of the source/drain regions by laser thermal annealing using a laser;

moving the laser and the substrate relative to one another; and

activating another portion of the source/drain regions by laser thermal annealing using the laser,

wherein a spot area of the laser on the substrate is less than 50 millimeters^2.

7. The invention according to claim 6, wherein each portion of the source/drain regions receives no more than one single pulse of energy from the laser.

8. The invention according to claim 6, wherein each portion of the source/drain regions receives more than one single pulse of energy from the laser.

9. The invention according to claim 8, wherein each pulse from the laser respectively irradiates non-identical portions of the source/drain regions.

10. The invention according to claim 6, wherein the laser and the substrate move relative to one another at a constant velocity.

11. A method of manufacturing a semiconductor device, comprising the steps of:

forming a gate electrode over a substrate;

introducing ions into the substrate to form source/drain regions in the substrate proximate to the gate electrode;

activating a portion of the source/drain regions by laser thermal annealing using a pulse of laser energy from a laser;

moving the laser and the substrate relative to one another; and

activating another portion of the source/drain regions by laser thermal annealing using another pulse of laser energy from the laser,

wherein the laser and the substrate move relative to one another after each pulse of laser energy and each portion of the source/drain regions receives more than one single pulse of energy from the laser.

12. The invention according to claim 11, wherein each pulse from the laser respectively irradiates non-identical portions of the source/drain regions.

13. The invention according to claim 11, wherein a spot area of the laser on the substrate is less than 50 millimeters^2.

14. The invention according to claim 11, wherein the laser and the substrate move relative to one another at a constant velocity.

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TRADEMARK

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According to the present invention, the problem of fluence variation on substrates is solved, in part, by continuously moving the laser and substrate relative to one another while activating portions of source/drain regions, as recited in claim 1. By continually moving the substrate and laser relative to each other, laser pulsing is not interrupted, which allows for greater utilization of the laser (page 8, lines 17-24). The problem of fluence variance is also minimized by reducing the spot area from the laser to less than 50 millimeters^2, as recited in independent claim 6. Because the fluence density is less distorted using a smaller spot, the variation of total fluence provided on the surface is reduced (page 8, lines 1-8). Another solution to the problem

of fluence variance is to expose each portion of the source/drain regions to more than a single pulse of energy from the laser, as recited in claim 11. By exposing each discrete portion of the source/drain regions to several pulses, the variations in fluence between each pulse can be averaged out, which reduces the variance of total fluence provided to the source/drain regions (page 7, lines 23-30). The present invention, thus, constitutes an improvement over conventional methods of manufacturing semiconductor devices by providing methodology that reduces fluence variation to the substrate and increases laser annealing efficiency.

VI. ISSUES

A. The Rejections:

1. Claims 1, 3-6 and 8-14 were rejected under 35 U.S.C. § 102 for lack of novelty based upon Yamazaki et al.; and

2. Claims 2 and 7 were rejected under 35 U.S.C. § 103 for obviousness based upon Yamazaki et al. in view of Appellants' Admitted Prior Art.

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On page three of the statement of the rejection, the Examiner identified column 9, lines 26-50, in Yamazaki as teaching the last clause in independent claim 1, which is reproduced below:

> wherein the movement of the laser and the substrate relative to one another is continuous between and during the steps of activating the portion of the source/drain regions and activating the other portion of the source/drain regions.

For ease of analysis, column 9, lines 26-50 of Yamazaki is reproduced below:

> In a case where TFTs are formed with crystalline silicon film, when an impurity ion for providing one conductivity type, such as phosphorus or boron, is doped into source and drain regions by ion doping or plasma doping in a self-alignment using a gate electrode as a mask, the doped regions become amorphous or crystallinity thereof is remarkably reduced due to impact of an accelerated ion. Thus, an annealing process for restoring crystallinity of the source and drain regions is required. The doped impurity ion do not act as an impurity for controlling the conductivity type when no treatment is performed. Thus, annealing for activating the impurity ion is required.

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Appellants submit that the Examiner failed to establish where, specifically, the above-identified limitation in claim 1 can be found in Yamazaki.[2] In particular, Appellants refer to the term "the movement ... is continuous between and during the steps of activating the portion ... and activating the other portion."

In the Final Office Action, the Examiner offered the following statement:

> Applicant's arguments filed 2/27/03 have been fully considered but they are not persuasive. Please note on **Fig. 2** that the substrate is not permanently fixed to the stage and therefore moves relative to the laser beam. Applicant contends that the applied art fails to provide continuous movement because applicant has chosen a term that is not actually cited on the reference. <u>However, the reference teaches the term oscillating.</u> One or ordinary skill in the art would recognize that a failure to move the laser <u>continuously (i.e. oscillating)</u> will apply energy beyond the desired goal in forming a thin film transistor having a source/drain regions which are well known in the art. (emphasis in bold in original) (emphasis in underline added).

The Examiner, therefore, has equated the teaching of an "oscillating" movement with the claimed "continuous movement." Notwithstanding that the Examiner has failed to establish between what steps the laser in Yamazaki is oscillating and whether these steps correspond to the steps between which the claimed continuous movement occurs, the terms "oscillating movement" and "continuous movement" would not be considered equivalent by one having ordinary skill in the art. The plain meaning of the term "oscillate" is to move back and forth, and when our object

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With regard to claim 3, Appellants previously argued that the Examiner has failed to clearly identify the claimed limitation of "wherein each portion of the source/drain regions receives more than one single pulse of energy from the laser," in compliance with 37 C.F.R. § 1.104(c). Although the Examiner has pointed to col. 7, lines 1-63 in Yamazaki to disclose this particular feature, it is not apparent where this limitation is disclosed in Yamazaki. Therefore, Appellants respectfully submit that Yamazaki fails to identically disclose this limitation. Despite Appellants' previous arguments that the Examiner has failed to particularly identify this feature, the Examiner has neither clarified where this limitation is found in Yamazaki nor explained why the Examiner's original identification (i.e., col. 7, lines 1-63) is sufficient to comply with the requirements of 37 C.F.R. § 1.104(c).

As to claim 8, Appellants have previously noted the Examiner asserts that Yamazaki identically discloses the limitations recited therein, but claim 8 depends upon claim 6, and the Examiner has not asserted that Yamazaki identically discloses the limitation in claim 6. If the Yamazaki identically discloses the limitations of claim 8, which includes the limitations of claim 6, how can Yamazaki not identically disclose the limitations of claim 6? Thus, the Examiner's rejections as to claims 6 and 8 are inconsistent. Furthermore, as discussed above with regard to claim 3, the Examiner has not clearly identified the portion of the reference being relied upon in the rejection, as the Examiner only generally referred to column 7, lines 1-63 of Yamazaki. It is

not apparent wherein Yamazaki teaches or suggests the limitations recited in claim 8. Therefore, Appellants respectfully submit that Yamazaki fails to identically disclose these limitations.

Claims 4, 9 and 12 each recite that each pulse from the laser respectively irradiates non-identical portions of the source/drain regions. The Examiner has not interpreted the expression "non-identical portions." As such, Appellants cannot evaluate the Examiner's assertion that this feature is disclosed in Yamazaki. Furthermore, the Examiner has not <u>clearly</u> identified any portion of the reference being relied upon. The Examiner has again broadly referred to column 7, lines 1-63 of Yamazaki. However, it is not apparent wherein Yamazaki teaches or suggests this limitation. Therefore, Appellants respectfully submit that Yamazaki fails to identically disclose these limitations.

As to claim 10, the Examiner asserts Yamazaki teaches that the laser and substrate move relative to one another at a constant velocity, but again, the Examiner has failed to <u>clearly</u> identify the portion in Yamazaki being relied upon. Although the Examiner subsequently identified column 6, lines 3-45 as disclosing this feature with regard to claim 14, it is not apparent that the claimed limitation can be found in this citation. Therefore, Appellants respectfully submit that Yamazaki fails to identically disclose these limitations. Yet again, although these issues were raised by Appellants in the Request for Reconsideration, the Examiner failed to address Appellants' arguments in the Final Office Action.

With regard to independent claim 11, the Examiner again asserts that Yamazaki teaches all the claimed features without <u>specifically identifying</u> where <u>any</u> of these features are disclosed in the cited reference. For example, the Examiner has failed to identically disclose where the limitation "the laser and the substrate move relative to one another after each pulse of laser

energy and each portion of the source/drain regions receives more than one single pulse of energy from the laser" is identically disclosed by Yamazaki.

THE REJECTION OF CLAIMS 5-6 AND 13 UNDER 35 U.S.C. § 102 FOR ANTICIPATION BASED UPON YAMAZAKI

In the Office Action dated December 8, 2003, the Examiner newly rejected claims 5-6 and 13 under 35 U.S.C. § 102 for anticipation based upon Yamazaki. In the prior Office Action (i.e., the Final Office Action dated April 28, 2003), claims 5-6 and 13 were rejected under 35 U.S.C. § 103 for obviousness based upon Yamazaki in view of Appellants Admitted Prior Art. The new portions of the Examiner's rejection are highlighted in bold on page 4 of the Office Action dated December 8, 2003.

Claims 5-6 and 13 each include a limitation directed to "a spot area of the laser on the substrate is less than 50 millimeters^2." In the statement of the rejection the Examiner referred to column 3, lines 24-25 of Yamazaki, and asserted that "**the linear beam of 1mm width and 125 mm length is equal 12.5 mm^2**" (emphasis in original). Upon reviewing the passage in Yamazaki cited by the Examiner and also reviewing column 7, line 48, Appellants agree that Yamazaki teaches a linear beam having a beam pattern of 125 mm x 1 mm. However, Appellants disagree with the Examiner's conclusion that 1 mm x 125 mm is 12.5 mm^2, since 1 mm x 125 mm is 125 mm^2. As 125 mm^2 is greater than the claimed less than 50 mm^2, Yamazaki fails to identically disclose this particular limitation within the meaning of 35 U.S.C. § 102.

THE REJECTION OF CLAIMS 2 AND 7 UNDER 35 U.S.C. § 103 FOR OBVIOUSNESS BASED UPON YAMAZAKI IN VIEW OF FIG. 2A OF APPELLANTS' ADMITTED PRIOR ART (HEREINAFTER ADMITTED PRIOR ART)

Claims 2 and 7 are patentable at least based upon their dependency respectively to claims 1 and 6. As discussed above, the applied prior art fails to identically disclose the limitations recited in independent claims 1 and 6. Furthermore, the Examiner has not established that the Examiner's secondary reference of the Admitted Prior Art overcomes the previously argued deficiencies of Yamazaki.

IX. CONCLUSION

It should, therefore, be apparent that the Examiner has failed to establish, within the meaning of 35 U.S.C. § 102, that Yamazaki identifies all of the claimed limitations recited in the claims. With regard to many of the claim limitations, including at least one limitation in all of the independent claims, the Examiner has only cited to broad sections of Yamazaki without clearly identifying where the claimed limitations are identically disclosed in Yamazaki. Furthermore, the Examiner's failed to set forth a prima facie case of obviousness for the claimed ranges since the Examiner's analysis lacks the findings of fact required by case law.

X. PRAYER FOR RELIEF

Based upon the foregoing, Appellants respectfully submit that one having ordinary skill in the art would not have found the claimed invention identically disclosed by Yamazaki within the meaning of 35 U.S.C. § 102 or that one having ordinary skill in the art would have found the

claimed invention obvious based upon Yamazaki in view of the Admitted Prior Art. Appellants, therefore, respectfully solicit the Honorable Board to reverse the Examiner's rejections under 35 U.S.C §§ 102, 103.

To the extent necessary, a petition for an extension of time under 37 C.F.R. § 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account 500417 and please credit any excess fees to such deposit account.

Respectfully submitted,

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APPENDIX

1. A method of manufacturing a semiconductor device, comprising the steps of:

forming a gate electrode over a substrate;

introducing ions into the substrate to form source/drain regions in the substrate proximate to the gate electrode;

activating a portion of the source/drain regions by laser thermal annealing using a laser; moving the laser and the substrate relative to one another; and

activating another portion of the source/drain regions by laser thermal annealing using the laser,

wherein the movement of the laser and the substrate relative to one another is continuous between and during the steps of activating the portion of the source/drain regions and activating the other portion of the source/drain regions.

2. The invention according to claim 1, wherein each portion of the source/drain regions receives no more than one single pulse of energy from the laser.

3. The invention according to claim 1, wherein each portion of the source/drain regions receives more than one single pulse of energy from the laser.

4. The invention according to claim 1, wherein each pulse from the laser respectively irradiates non-identical portions of the source/drain regions.

5. The invention according to claim 1, wherein a spot area of the laser on the substrate is less than 50 $millimeters^2$.

6. A method of manufacturing a semiconductor device, comprising the steps of:

forming a gate electrode over a substrate;

introducing ions into the substrate to form source/drain regions in the substrate proximate to the gate electrode;

activating a portion of the source/drain regions by laser thermal annealing using a laser;

moving the laser and the substrate relative to one another; and

activating another portion of the source/drain regions by laser thermal annealing using the laser,

wherein a spot area of the laser on the substrate is less than 50 $millimeters^2$.

7. The invention according to claim 6, wherein each portion of the source/drain regions receives no more than one single pulse of energy from the laser.

8. The invention according to claim 6, wherein each portion of the source/drain regions receives more than one single pulse of energy from the laser.

9. The invention according to claim 8, wherein each pulse from the laser respectively irradiates non-identical portions of the source/drain regions.

10. The invention according to claim 6, wherein the laser and the substrate move relative to one another at a constant velocity.

11. A method of manufacturing a semiconductor device, comprising the steps of:

forming a gate electrode over a substrate;

introducing ions into the substrate to form source/drain regions in the substrate proximate to the gate electrode;

activating a portion of the source/drain regions by laser thermal annealing using a pulse of laser energy from a laser;

moving the laser and the substrate relative to one another; and

activating another portion of the source/drain regions by laser thermal annealing using another pulse of laser energy from the laser,

wherein the laser and the substrate move relative to one another after each pulse of laser energy and each portion of the source/drain regions receives more than one single pulse of energy from the laser.

12. The invention according to claim 11, wherein each pulse from the laser respectively irradiates non-identical portions of the source/drain regions.

13. The invention according to claim 11, wherein a spot area of the laser on the substrate is less than 50 millimeters^2.

14. The invention according to claim 11, wherein the laser and the substrate move relative to one another at a constant velocity.